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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/719,807	02/20/2001	John G Mcinerney	Q-62334	4978

7590 11/05/2003

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EXAMINER	
MONDT, JOHANNES P	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/719,807	MCINERNEY ET AL.	
	Examiner	Art Unit	
	Johannes P Mondt	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *61-80* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *61-80* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

After-Final Proposed Amendment and Request for Reconsideration filed 09/22/2003 prompts the withdrawal of the previous Final Rejection and the issuance of a new Final Rejection for the reasons outlined below. For comments on Remarks in said After-Final Proposed Amendment and Request for Reconsideration please be referred to "Response to Arguments".

Response to Arguments

1. Applicant's arguments filed 09/22/2003 have been fully considered but they are not persuasive, with the exception of the inadvertent omission of claims 63-68 and 70-80 in the Heading of the rejection under 35 U.S.C. 102(b) of claims 61-68 and 70-80, which omission prompts the withdrawal of the Final Rejection and replacement thereof with a new Final Rejection. Examiner would like to sincerely apologize for the considerable confusion that said omission may have caused.

Applicant, in Remarks, alleges that Paoli fails to disclose features (c), (d) and (e), concluding that since the main electrical contact 30' is to extend substantially longitudinally relative to the active region 24 according to feature (a) and the secondary electrical contacts 28 are to extend in a direction generally transversely to the active region according to feature (d), that the main and secondary contacts must extend transversely to each other. This conclusion is in error, because of an illogical assumption of two-dimensionality of said plurality of secondary elongated electrical contacts:

On feature (d), Paoli discloses clearly that profiles of the pattern in 28 as depicted in Figures 3B and 3C extend throughout mask layer 40 within cap layer 28 (see column 4, lines 57-68 and column 5, lines 1-25). Therefore, secondary electrical contacts extend in more than one dimension, i.e., along the direction depicted in Figures 3 as well as in the vertical direction in Figure 3A (Figure 3A being taken at any point along the length of the amplifier with width W_i). It must therefore be concluded that the limitation defined by Applicant in his Remarks as feature (d), namely, that the secondary electrical contacts are extending from the main contact 30' "in a direction generally transversely of the active region" is met by Paoli. Furthermore, even without the extension along the vertical direction in Figure 3A as discussed above, the examiner takes the position that extending generally in a given direction does not exclude extending in a given other direction, and applies this position to both Figures 3B and 3C, where each of the contacts (black regions) is characterized as extending in both independent and orthogonal directions tangential to the paper. Because the length of the amplifier is, by definition of length, greater than its width, even what appear as dots in Figure 3B and stripes in Figure 3C are elongated electrical contact structures. Because in Figure 3A, taken at any point along the length of the amplifier section, the vertical dimension of the active region is its smallest (the horizontal direction in Figure 3A being the direction of its width, and the dimension perpendicular to the paper in Figure 3A being the direction of the length of the amplifier, hence the direction of the length of the active region) it follows that said elongated electrical contact structures

extend generally transversely to the active region. In conclusion on feature (d), the examiner must maintain that Paoli discloses said feature (d).

On feature (c): Applicant states that Paoli fails to disclose said feature because the secondary contacts are all either "open dots" (Figure 3B) or spaced apart from each other (Figure 3C), and Applicant concludes that said secondary electrical contacts are "therefore, not electrically connected". However, the connection is through the abutting main contact 30'. As with feature (d) the main confusion appears to be due to the failure to realize the additional dimension, through which the electrical contacts are connected. This is ensured in the Paoli invention because said secondary electrical contacts result from etching, using mask 40 within region 28 (cf. column 5, lines 20-25). In conclusion on feature (c), the examiner must maintain that Paoli discloses said feature (c).

On feature (e): because said secondary electrical contacts in 28 and said main contact 30' are connected electrically (feature (c): secondary electrical contacts electrically connect to said main contact) said secondary electrical contacts and said main contact must abut and hence can be said to form *the* actual contact area. Therefore, feature (e) also is disclosed in Paoli.

In view of the above, traverse of the rejection of claim 61, based on the allegation that Paoli fails to disclose features (c), (d) and (e) is found without merit, and the rejection of claim 61, and method claim 75 (for which no arguments separate from those advanced in the traverse of claim 61 have been made) is repeated here.

The only possible distinction that occurs to the examiner at this time is the circumstance that the patterns (Figures 3B and 3C) of secondary electrical contacts in

Paoli clearly aim at producing a lateral gain profile without plateau as opposed to a non-contact gain profile with plateau in the present application (see Figure 2 in the Specification and Figures 4A and 4C in Paoli).

With regard to the traverse of the rejection of claim 69 under 35 U.S.C. 112, first paragraph, the traverse seems to be based on (a) page 11, lines 5-17 and (b) page 9, line 29 – page 10, line 2. With regard to the passage in the Specification under (a) this passage is formulated purely in the hypothetical: Applicant simply states prior to said passage that grating effects in general are to be avoided and in fact are avoided (page 11, lines 5-17), while admitting in said passage that certain types of grating effects "may be desirable in certain implementations of the device" and that "would be achieved" in a manner indicated in said passage. With regard to the passage in the Specification under (b), it is wholly devoted to a teaching against said grating effects. Now, additionally, Applicant respectfully refers to the circumstance that the condition for producing said grating effects is described in the Specification to be the variation of contact area to non-contact are in the area 12 in the direction of light propagation, while in the case of the device taught by Paoli the light propagation is horizontal and the ratio of contact area divided by non-contact area in the embodiment of Figure 3C varies in both horizontal directions. In conclusion, although the disclosure remains characterized as faulty the conditions for which said grating effects would be manifest are actually disclosed by Paoli. Therefore, in addition to a repeat of the rejection under 35 U.S.C. 112, first paragraph, a rejection under 35 U.S.C. 102(b) is herewith added.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. ***Claim 69*** is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. In particular, the references pertaining to the subject matter of this claim are: (a) the final paragraph on page 15 of the disclosure, stating that it "will also be appreciated that while the laser devices have been described with the first contacts shaped to avoid induced grating effects, the first and / or second contacts may be shaped to induce predetermined grating effects where such grating effects are desired"; (b) page 11, lines 19-23, in which, however, within the context of a general teaching away from grating effects (page 11, lines 5-17), mention is made of a hypothetical alteration of the device in which a grating effect in the longitudinal direction "may be desirable" and "would be" achieved in a manner stipulated. Laser devices with first and / or second contacts shaped to induce predetermined grating effects have not been disclosed.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. ***Claims 61-80*** are rejected under 35 U.S.C. 102(b) as being anticipated by Paoli (5,228,049).

With regard to claim 61: Paoli teaches (Figures 1, 3A, 3B, and 3C) a semiconductor device 10 (cf. abstract, first sentence; column 3, lines 50-51) comprising a semiconducting medium 22-26 which defines a junction (through the active region 24 between first and second cladding layers 22 and 26 (cf. column 3, line 60 – column 4, line 5)), a first electrical contact 28/30' (cf. column 4, lines 3-5 and lines 11-12) and a second electrical contact 32 (cf. column 4, lines 11-12), the respective electrical contacts 28/30' and 32 being located spaced-apart from each other on the semiconductor medium 22-26 and in electrical contact with the semiconductor medium 22-26 for pumping current through the junction 24 for forming an active region 24 in the junction, the first electrical contact defining an outline area (defined by the lateral borders of region 28) on the semiconductor medium 22-26 for determining the shape and area of the active region 24, and defining an actual contact area (that portion of 28 that has not been etched away, or, in the alternative: bombarded with protons to substantially alter the resistivity, see Figures 3B and 3C and column 5, lines 15-61), in

which the first electrical contact is in actual electrical contact with the semiconductor medium 22-26, and defining non-contact areas within the outline area in which no electrical contact takes place between the first electrical contact and the semiconductor medium 22-26 (namely: area in which 28 has been etched away, or, in the alternative: bombarded with protons to substantially alter the resistivity; see Figures 3B and 3C and column 5, lines 15-61), the ratio of the area of the actual contact area to that of the non-contact area varying with the outline area for varying the current density spatially in the active region (cf. title, abstract, and column 1, lines 40-53), wherein the first contact comprises:

a main electrical contact 30' extending substantially longitudinally relative to the active region (cf. Figures 1 and 2, and column 4, line 11), and

a plurality of spaced apart elongated secondary electrical contacts 28 electrically connected to the main contact (cf. Figures 1 and 3C and column 4, lines 60-63; column 5, lines 44-61 and column 5, lines 30-35), and extending from the main contact in a direction generally transverse to the active region (cf. Figure 7 and column 5, lines 15-61), the secondary electrical contacts and the main electrical contact together forming the actual contact area 28/30' and cooperating to define the non-contact areas.

In conclusion, Paoli anticipates claim 1.

With regard to claim 62: In the semiconductor device as taught by Paoli the secondary contacts 28 are provided by respective elongated spaced apart substantially parallel finger contacts (cf. Figure 3C and column 5, lines 44-61) tapering from their respective proximal ends to their distal ends (cf. Figure 3C and column 5, lines 44-61).

With regard to claim 63: it is inherent in the semiconductor device of claim 61 as anticipated by Paoli that when the ratio of the area of the actual contact area to that of the non-contact areas defined by the first electrical contact is varied then so does the current density in the active region vary, because of Ohm's law.

With regard to claim 64: the ratio of actual contact to non-contact area of the first electrical contact in the semiconductor device of claim 1 as anticipated by Paoli varies in a transverse direction across the active region 24 relative to the longitudinal direction of the active region 24 for varying the current density transversely across the active region (cf. abstract, second sentence) and is progressively reduced towards opposite side edges of the active region 24 (cf. Figures 3A, 4A and 4C; column 6, lines 32-34 and lines 40-45), which extend in a generally longitudinal direction relative to the active region 24 for progressively reducing the current density in 24 towards the respective side edges. Therefore, Paoli anticipates claim 64.

With regard to claim 65: in the semiconductor device of claim 61 as anticipated by Paoli the ratio of the area of the actual contact area to that of the non-contact areas defined by the first electrical contact is varied in a direction longitudinally relative to the longitudinal direction of the active region; in fact, said ratio is varied in two directions in the plane of the plan view of Figure 3C.

With regard to claim 66: In the semiconductor device of claim 61 as anticipated by Paoli the ratio of the area of the actual contact area to that of non-contact areas defined by the first electrical contact is arranged in a direction generally transversely of the direction in which the ratio of the respective areas is varying (arranged in the

horizontal direction in Figure 3C which is transverse of the direction in which the ratio is varying; said ratio has a particular value when taken to pertain to an area of infinitesimal vertical extent in Figure 3C and varies in the direction perpendicular to the latter by mathematical necessity) for maintaining the current density in the active region 24 substantially constant current density which extend in a direction generally transversely of the direction in which the ratio of the respective areas is being varied (namely: perpendicular to the electrodes by virtue of the voltage between the upper and lower electrodes 30 and 32, respectively).

With regard to claim 67: The shape and area of the non-contact areas in the semiconductor device of claim 61 as anticipated by Paoli is such that the current density in areas of the active region 24 that correspond to the non-contact areas is greater than zero by virtue of the finite value of the resistivity in said non-contact areas, as is evident from first principles of electricity.

With regard to claim 68: The shape and area of said non-contact areas in the semiconductor device of claim 61 as anticipated by Paoli is such as to avoid induced grating effects by virtue of the stated current density profile (see Figures 3) in which no such grating effects are in evidence, because no modal distortion of any kind is present (cf. column 6, lines 40-45). Therefore, Paoli anticipates claim 68.

With regard to claim 69: although, as discussed above, the limitation of this claim is not disclosed in the Specification, the conditions for the grating effects to occur has been discussed in the Specification and has been defined as a variation of the ratio of contact area to non-contact area in the direction of light propagation (Specification,

page 11, lines 19-23). Paoli does disclose a ratio of contact area to non-contact area that varies in the direction of light propagation, because said ratio varies along each of any two chosen independent directions in the plane of Figure 3C in Paoli, said non-contact area (white portions) diminishing relate to said contact area (black portions) going upward as well as toward the centre.

With regard to claim 70: The junction in the semiconductor device of claim 61 as anticipated by Paoli is a p-n junction: the active region 24 is flanked by an n-cladding layer 22 and a p-cladding layer 26 (cf. column 3, line 63 – column 4, line 5).

With regard to claim 71: the semiconductor device of claim 61 as anticipated by Paoli is characterized in that the first and second electrical contacts 30/28 and 32, respectively, are located on respective opposite surfaces (upper and lower, respectively, with reference to Figures 1 and 3A) of the semiconductor device for pumping the current through the active region 24 of the junction. Therefore, Paoli anticipates claim 71.

With regard to claim 72: The semiconductor device of claim 61 as anticipated by Paoli is an optical semiconductor device (namely: laser, cf. title), the longitudinal direction of the active region 24 (i.e., a horizontal direction out of the paper in Figures 1 and 3A) being defined by the direction of light propagation in the active region (by virtue of the TE (transverse electric; note the electric field is vertical in the Figures as is the current density) nature of the output mode: cf. column 3, lines 14-18; see also "Background of the Invention", column 1, lines 17-20). Therefore, Paoli also anticipates claim 72.

With regard to claim 73: The ratio of actual contact area to non-contact area of the first electrical contact is varied for inducing a current density profile (this is the very subject and goal of the patent by Paoli; see abstract, third sentence, and local references above) in the active region, which substantially coincides with the desired light intensity profile in the active region (inherent in the generation mechanism of said light through charge carriers moving in the direction of the applied electric field, i.e., vertically). Therefore, Paoli anticipates claim 73.

With regard to claim 74: The ratio of actual contact area to non-contact area of the first electrical contact is varied transversely across said direction of light propagation in the active region (because said ratio is varied in the direction at which the current profile is to be tailored), the transverse profile of which substantially coincides with the desired transverse profile of light intensity at the corresponding location in the active region 24 (inherent in the generation mechanism of said light through charge carriers moving in the direction of the applied electric field, i.e., vertically). Therefore, Paoli anticipates claim 74.

With regard to claim 75: The device of claim 61 would necessarily have to be formed in order to function. Claim 75 fails to further limit the device of claim 61 other than simply state the formation of each of its components.

With regard to claim 76: The device of claim 62 would necessarily have to be formed in order to function. Claim 76 fails to further limit the device of claim 62 other than simply state the formation of each of its components.

With regard to claims 77-79: The device of claim 63 would necessarily have to be formed in order to function. Claims 77-79 fail to further limit the device of claim 63 other than simply state the formation of each of its components.

With regard to claim 80: by virtue of the substantial absence of any remaining electrical conductivity in any portion of region 28 as an inherent aspect of the process of etching away the GaAs material (highly doped, hence conductive, p+ GaAs) in said portion, the ratio of actual contact area to non-contact area also represents the proportion of overall current density in 24, while it is inherent, through Ohm's law or any nonlinear improvement thereof, in any variation of the electrical conductivity in any specific direction that the associated current density is varied thereby and in the same direction. As a corollary of this inherent property linking variation in electrical conductivity with variation in current density in the same direction of said variation of electrical conductivity: in particular when the need would arise to progressively vary the current density in the active region, by the simple proportionality between electrical conductivity and current density under fixed applied voltage as given by Ohm's law, or any nonlinear improvement of said Ohm's law, such progressive variation of the current density is achieved by a corresponding progressive variation of said ratio. Therefore, Paoli anticipates claim 80.

Conclusion

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 703-306-0531. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

JPM
November 1, 2003